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<p>(21) International Application Number: PCT/US94/02927</p> <p>(22) International Filing Date: 18 March 1994 (18.03.94)</p> <p>(30) Priority Data:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">034,281</td> <td style="width: 40%;">23 March 1993 (23.03.93)</td> <td style="width: 30%;">US</td> </tr> <tr> <td>201,919</td> <td>24 February 1994 (24.02.94)</td> <td>US</td> </tr> </table> <p>(60) Parent Application or Grant</p> <p>(63) Related by Continuation</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;">US</td> <td style="width: 40%;">201,919 (CON)</td> <td style="width: 30%;"></td> </tr> <tr> <td>Filed on</td> <td>24 February 1994 (24.02.94)</td> <td></td> </tr> </table> <p>(71) Applicant (for all designated States except US): GILLETTE CANADA INC. [CA/CA]; 16700 Trans Canada, Kirkland, Quebec H9H 4Y8 (CA).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): BREDALL, William, A. [US/US]; 540 Dolphin Drive, Pacifica, CA 94044 (US). SIMMS, Graham, J. [GB/US]; Apartment 1802, 1501 Beacon Street, Brookline, MA 02146 (US).</p> <p>(74) Agents: GALLOWAY, Peter, D. et al.; Ladas & Parry, 26 West 61st Street, New York, NY 10023 (US).</p>		034,281	23 March 1993 (23.03.93)	US	201,919	24 February 1994 (24.02.94)	US	US	201,919 (CON)		Filed on	24 February 1994 (24.02.94)		<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>
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<p>(54) Title: INTERPROXIMAL BRUSH</p>														
<p>(57) Abstract</p> <p>An interproximal brush (10) has an elongated one piece body member (12) forming a planar surface (22) disposed between two leg members (18, 20) from which a substantially rigid boss (24) extends for supporting a brush member (14). A plurality of hinges (26, 28, 30, 32) are formed in the body member (12) at either end of the boss (24) and the leg members (18, 20) are folded and attached for slidable movement relative to one another. The planar surface (22) rotates to move the brush (14) from a position in alignment with the direction of movement of the leg members (18, 20) to a position forming an angle with the direction of movement of the leg members (18, 20), when the leg members (18, 20) are moved relative to one another. The one piece body member (12) may also be made foldable in the opposite direction to encase the brush (14) within the leg members (18, 20), or a bumper (100) may be provided for supporting the planar surface (22) when the brush (14) is rotated.</p>														

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- 1 -

INTERPROXIMAL BRUSH

The present invention relates to interproximal brush devices for oral care, and more particularly to a brush device which is compact in structure and capable of being carried on the person of the user.

Various teeth cleaning aids have been provided which perform the cleaning of one's teeth and massaging of the gums, the brushes taking on various forms such as wire bristles or foam material and generally are designed to rub or wipe perpendicularly across the gum and tooth surfaces. One brush which has been found useful in this manner is a small, twisted, wire-type, disposable brush wherein bristles are captured between, and extend radially from a pair of twisted metal wires. Brushes of this type are shown and described in United States Patent 4,780,923 issued to Schultheiss and United States Patent 5,029,358 issued to Zimmerman, both assigned to the assignee of the present invention. These devices have met with commercial success, however due to their construction they are primarily limited for usage in the home as they are not simple to carry on the person of the user. It is therefore necessary to employ the use of

- 2 -

toothpicks of wood, or other material, when it is desired to perform a cleaning function between the teeth when the user is at locations other than in the home. However, the use of
5 such devices often is not as satisfactory as the employment of a brush of the type set forth above.

In view of the present emphasis on oral hygiene, and in particular the maintaining
10 of cleanliness in those areas between the teeth on a daily basis, a need has arisen for an interproximal brush which may be easily carried on the person and which is simple to use.

It is therefore an object of the
15 present invention to provide an interproximal brush which is compact in structure and easily carried on the person.

Another object of the invention is to provide an interproximal brush of the type set
20 forth above which is simple in construction and easy to manufacture.

A further object of the invention is to provide an interproximal brush of the type set forth above which is economical to
25 manufacture and therefore economical for the user to replace after a period of usage.

The above objects and other objectives which will become apparent as the description proceeds are accomplished by providing an
30 interproximal brush having an elongated body member with brush means attached thereto. The body member comprises a pair of parallel legs slidably attached for movement relative one to the other in the direction of the body member
35 axis, and means are provided interconnecting the brush means to the body member whereby movement of the legs relative to one another is effective

- 3 -

to move the brush means angularly with respect to the body member axis.

The body member of the brush generally may be manufactured as a unitary element and the
5 brush means may be supported in a substantially rigid boss provided on the body member. The body member may further comprise a flat, planar platform which has the boss formed thereon, at least a portion of the platform substantially
10 transecting the body member axis, and the brush means consists of a brush of the type having an axial stem which is received in the boss. The flat planar platform is provided with a hinge means disposed at either side thereof for
15 connecting the platform to each of the respective legs and the hinge means comprises a pair of grooves formed across the width of the platform on opposite sides of the semi-rigid boss.

20 A second pair of grooves may be formed across the width of the platform each spaced from the first grooves to form a pair of hinge members which are each hingedly connected to a respective leg for movement thereby.

25 The interproximal brush body member is generally manufactured of an elastomeric material which is effective to provide the hinge members when grooves are formed in the material.

In one embodiment of the invention a
30 pair of cavities are formed in a respective surface of each of the legs such that when the brush means is mounted on the boss it is enclosed within the cavities with the legs disposed with the cavity surfaces in facing
35 relationship.

In yet another embodiment of the invention an inwardly extending bumper means is

- 4 -

formed on the lower surface of the planar platform between the first pair of hinges and the bumper means has a pair of opposite facing surfaces. A first surface is disposed for
5 contacting a portion of the platform between one of said first pair of hinges and one of the second pair of hinges and a second surface is disposed for contacting the portion of the platform between the second of the first pair of
10 hinges and the other of the second pair of hinges during movement of the brush means angularly with respect to the body member.

Reference is made to the accompanying drawings in which there is shown illustrative
15 embodiments of the invention from which its novel features and advantages will be apparent, wherein:

Figure 1 is a front elevational view showing an interproximal brush constructed in
20 accordance with the teachings of the present invention;

Figure 2 is a front elevational view similar to Figure 1, showing the interproximal brush of Figure 1 in a configuration assumed
25 during usage of the brush;

Figure 3 is a front elevational view similar to Figures 1 and 2, showing the structure of the interproximal brush in a second configuration assumed during usage of the brush;

30 Figure 4 is a top plan view showing details of the body portion of the interproximal brush of Figures 1, 2 and 3;

Figure 5 is a side elevational view of the structure of Figure 4 showing further
35 details of the brush;

Figure 6 is an end view of the structure of Figure 5;

- 5 -

Figure 7 is a bottom plan view of the structure of Figures 4 through 7 showing further details of the brush body portion;

5 Figure 8 is an elevational perspective view showing the top details of the brush body member of Figures 4 through 7;

Figure 9 is an elevational perspective view showing the bottom details of the structure of Figures 4 through 8;

10 Figure 10 is an elevational sectional view taken along the line X-X of Figure 5 taken on an enlarged scale for clarity;

15 Figure 11 is an elevational sectional view similar to Figure 10 taken on the line XI-XI of Figure 5;

Figure 12 is an enlarged sectional view showing the elements of the body structure when in the configuration of Figures 1 through 3;

20 Figure 13 is a side elevational view of an alternate embodiment of an interproximal brush constructed in accordance with the teachings of the present invention;

25 Figure 14 is a bottom plan view of the brush of Figure 13 showing details of the body structure;

Figure 15 is a top plan view showing further details of the body structure of Figures 13 and 14;

30 Figure 16 is an end view of the structure of Figure 13;

Figure 17 is a top elevational perspective view of the structure of Figures 13 through 16;

35 Figure 18 is an elevational view showing the interproximal brush of Figures 13 through 17 in a configuration for storage or

- 6 -

carrying on the person of the user;

Figure 19 is an elevational view showing the interproximal brush of Figure 18 in a configuration during usage;

5 Figure 20 is a cross-section through the gripping portion of the device shown in Figure 19;

10 Figure 21 is a front elevational view, similar to Figure 1, showing a further embodiment of an interproximal brush constructed in accordance with the teachings of the present invention;

15 Figure 22 is a fragmentary front elevational view showing the interproximal brush of Figure 21 in a configuration assumed during usage of the brush;

20 Figure 23 is a fragmentary front elevational view showing the interproximal brush of Figure 21 in a second configuration assumed during usage of the brush;

25 Figure 24 is a fragmentary elevational view showing the structure of Figures 22 and 23 in the unassembled configuration, similar to Figure 5;

30 Figure 25 is a bottom plan view showing details of the structure of Figures 22 through 24; and

35 Figure 26 is a front elevational view showing the structure of Figure 21 with the brush disposed in the extreme right angle position during usage of the interproximal brush of Figures 21 through 25.

Referring now to the drawing and in particular to Figures 1 through 3 there is shown an interproximal brush 10 comprising a body member 12 and a brush assembly 14. A cap 15 shown in Figure 1 is provided for covering the

- 7 -

brush assembly 14 when the interproximal brush 10 is not in use, and is received as a force fit in interfitting engagement with the body member 12. The interproximal brush 10 is compact in construction so that it may be easily carried on the person of the user, and is therefore preferably between two and three inches in height from the base of the body member to the tip of the brush assembly.

As shown in Figures 2 and 3, the body member 12 has a plurality of knurls 16 formed on its surface to provide gripping surfaces for the user to hold the interproximal brush 10 between the thumb and finger, and by manipulation the brush assembly 14 is caused to move to a position wherein the axis of the brush assembly 14 is out of alignment with the general axis of the body member 12, providing the user with a more convenient angle of the brush for cleaning between the teeth.

Referring now to Figures 4 through 11, the body member 12 is shown to be formed of a unitary element manufactured of an elastomeric material. The material may be polypropylene or any similar material in which "living hinges" may be formed, as such hinges are well known in the art of plastic construction.

The body member 12 comprises a pair of leg members 18 and 20, the leg members being connected by a substantially flat planar platform 22 having an upper surface from which an upwardly extending boss 24 extends. The boss 24 is formed of the same material as the remainder of the body member 12, however due to the thickness and cylindrical construction is substantially rigid compared with the platform 22 to retain its orientation when in use. The

- 8 -

boss 24 has an opening 25 formed therein for receiving the axial stem of the brush assembly 14 in interfitting engagement. The stem of the brush assembly 14 is generally a force fit into the opening 25, and however it may be fixed by adhesive or other means.

As best shown in Figures 5, 7 and 9, the platform 22 at its underside contains a plurality of grooves formed thereon, a pair of grooves 26 and 28 being formed across the width of the platform one on either side of the boss 24 to provide a pair of hinges in the platform. A second pair of grooves 30 and 32 are formed across the width of the platform 22 and are each spaced from the first pair of grooves 26 and 28 to provide a second pair of hinges. Each of the grooves 30 and 32 are disposed adjacent the inner extremity of a respective leg member 18 and 20.

In the present construction the thickness T, as shown in Figure 5, of the platform 22 is in the area of 1.20 mm. and is diminished to a thickness of 0.50 mm. by formation of the grooves 26, 28, 30 and 32. While these dimensions are effective in the present embodiment to form hinges in the platform 22 it is recognized that these dimensions may vary with the employment of various available materials, the objective being that of providing four separate hinges at the locations described, in the platform 22.

Referring now to Figures 7, 9, 10 and 11, at the underside of the body member 12 a pair of elongated slotted openings 34 and 36 are formed in the legs 18 and 20 respectively to provide a means for slidably attaching the legs together in forming the interproximal brush 10

- 9 -

of Figures 1 through 3. The slotted opening 34 has formed therein an elongated protuberance 38 and the slotted opening 36 has at the edges thereof a pair of elongated flanges 40 and 41 which are spaced at a dimension less than the width of the protuberance 38, however being spaced to allow for the protuberance to be forced between the flanges and into the slotted opening 36. With the protuberance 38 retained within the slotted opening 36 the legs 18 and 20 are held firmly in facing relationship one with the other but are free to slide axially with respect to one another, as depicted in Figures 1, 2 and 3.

With the materials employed in the present construction the width of the protuberance 38 is in the area of 1.35 mm. while the minimum opening between the flanges 40 and 41 is in the area of 1.20 mm. In the present construction, these dimensions are effective to allow a snap fit of the protuberance 38 into the slotted opening 34 between the flanges 40 and 41, while retaining the protuberance within the slotted opening during sliding motion of the legs 18 and 20 in the axial direction of the interproximal brush 10, when assembled.

Referring now to Figures 13 through 20 there is shown an alternate embodiment of the present invention wherein like elements have been given like reference numerals as those of Figures 1 through 12, where applicable. As shown in Figures 13, 14 and 15 the interproximal brush 10a comprises a body member 12 and brush assembly 14, the brush assembly being mounted into a rigid boss 24 which extends upwardly from a platform 22 having a plurality of grooves 26, 28, 30 and 32 formed therein to provide hinges,

- 10 -

as described in the embodiment of Figures 1 through 12.

However, in the present embodiment, a pair of legs 18a and 20a are provided with alternating semi-cylindrical projections 43, 44, 45 and 46, and semi-cylindrical cavities 47, 48, 49 and 50 disposed adjacent the distal end of each of the legs. A pair of cavities 52 and 54 each in the shape of a half frustum is formed having its larger opening adjacent the platform 22 and a pair of extending tabs 55 and 56 are disposed one at each end of the respective leg 18a and 20a.

At the underside of the leg 20a there is disposed a protuberance 58 in the form of an elongated semi-cylinder and an elongated cavity 60 having an internal radial surface is formed in the leg 18a for receiving the protuberance 58 as a snap fit, and allowing the protuberance 58 to slide within the cavity. As best shown in Figure 20, the protuberance 58 has a maximum dimension D which is of greater dimension than the minimum dimension W of the concave cavity 60. The radius of the protuberance 58 is smaller than the radius of the concave cavity 60 such that when the protuberance 58 is snapped into the cavity 60, the legs 20a and 18a are free to slide one against the other while being retained in surface to surface engagement.

As best shown in Figures 18 and 19, with the legs 18a and 20a folded such that the brush assembly 14 extends outwardly for employment by the user, the protuberance 58 is snapped into the concave cavity 60 and the legs 18a and 20a are free to slide one against the other moving the brush assembly 14 in a similar manner to that shown in Figures 1, 2 and 3.

- 11 -

It will be noted that no cap is provided for the alternate structure 10a, for when the user desires to carry the interproximal brush 10a on his person the tabs 55 and 56 are forced apart releasing the protuberance 58 from the cavity 60 and the legs 18a and 20a are reversed, as shown in Figure 18, such that the brush assembly 14 is retained within the enclosure formed by the half frustum cavities 52 and 54. The projections 43, 44, 45 and 46 are received in the cavities 47, 48, 49 and 50 which are constructed to provide a snap fit, thereby retaining the interproximal brush 10a in the configuration shown in Figure 18. When it is desired to employ the interproximal brush, the tabs 55 and 56 are employed to unsnap the legs 18a and 20a one from the other and the legs 18a and 20a are then returned to the configuration shown in Figure 19, the tabs being employed to force the protuberance 58 into the cavity 60.

Referring now to the embodiment shown in Figures 21 through 26, there is shown an interproximal brush 10 similar to that shown in Figures 1 through 12 comprising a body member 12 and a brush assembly 14. The body member 12 comprises a pair of leg members 18 and 20 having knurled portions 16, the legs 18 and 20 being in all respects identical to those legs of the interproximal brush shown in Figures 1 through 12.

However, as best shown in Figures 22 through 25, the embodiment comprises a flat planar platform 122 having a first pair of grooves 126 and 128 formed across the width of the platform, one on either side of the boss 24, to provide a pair of hinges on the platform. A second pair of grooves 130 and 132 are formed

- 12 -

across the width of the platform 122 spaced from the first pair of grooves 126 and 128 to provide a second pair of hinges.

5 An inwardly extending bumper 100 is formed on the lower surface of the platform 122 and lies substantially between the first pair of hinges 126 and 128. The bumper 100 is rectangular in shape and has a pair of oppositely facing surfaces 102 and 104.

10 Referring now to Figures 22 and 23, it will be observed that when the legs 18 and 20 are moved relative one to the other to orient the brush means 14 angularly with respect to the axis of the body member 10, the surfaces 102 and
15 104 contact the lower surface of the platform 122 between one of the first pair of hinges 126 or 128 and the second pair of hinges 128 and 132. Thus, in addition to adding stability to the boss 24 when the interproximal brush is
20 employed, the bumper 100 (which becomes in effect an extension of the boss 24) is gripped between those portions of the platform 122 between the first set of hinges 126 and 128 and second pair of hinges 130 and 132 adding to the
25 rigidity of the structure at any particular angle which the brush assembly 14 assumes.

As shown in Figures 22 and 23, the orientation of the brush means 14 at an acute angle with respect to the axis of the body
30 member 10 provides added rigidity to the structure as explained above. However, as shown in Figure 26, the movement of the leg members 18 and 20 to a position wherein the base of the bumper 100 is in contact with the inner surface
35 of the leg 20 provides a substantially rigid structure. As will be evident from Figure 26, the bumper 100 bottoms out onto the inner

- 13 -

surface of the leg 12, while a lower surface of the platform 122 between the hinges 128 and 132 holds the surface 104 to provide a substantially rigid structure, which is often required in use of an interproximal brush.

From the foregoing it should be evident that the present invention provides an interproximal brush which is portable and easily carried on the person. It however should be understood that the various features disclosed are susceptible to incorporation into a full size interproximal brush without departing from the spirit of the invention. The structure further is one which is simple to manufacture, employing a minimum number of parts which are easily constructed and assembled.

While it is apparent that changes and modifications can be made within the spirit and scope of the present invention, it is my intention, however, only to be limited by the appended claims.

- 14 -

C L A I M S

1. An interproximal brush comprising:
an elongated member having brush means
attached thereto;
5 said body member comprising a pair of
parallel legs slidably attached for movement
relative one to the other in the direction of
the body member axis, and
means interconnecting said brush means
10 to said body member whereby movement of said
legs relative to one another is effective to
move said brush means angularly with respect to
said body member axis.
2. An interproximal brush as set forth in
15 claim 1, wherein said body member is unitary
element.
3. An interproximal brush as set forth in
claim 1, wherein said brush means is supported
in a substantially rigid boss provided on said
20 body member.
4. An interproximal brush as set forth in
claim 3, wherein said body member further
comprises a substantially flat planar platform
having said boss formed thereon wherein at least
25 a portion of said platform substantially
transects said body member axis.
5. An interproximal brush as set forth in
claim 4, wherein said brush means comprises an
axial stem, said stem being received in said
30 boss.
6. An interproximal brush as set forth in
claim 4, wherein said substantially flat planar
platform is provided with hinge means disposed
at either side thereof for connecting said
35 platform to each of said respective legs.
7. An interproximal brush as set forth in
claim 5, wherein said hinge means comprises a

- 15 -

pair of grooves formed across the width of said platform on the opposite sides of said boss.

8. An interproximal brush as set forth in claim 7, wherein said hinge means further
5 comprises a second pair of grooves formed across the width of said platform, each spaced from said first pair of grooves to form a pair of hinge members, wherein each of said hinge
10 members is hingedly connected to a respective leg for movement thereby.

9. An interproximal brush as set forth in claim 8, wherein the body member is manufactured of an elastomeric material.

10. An interproximal brush handle
15 comprising a unitary elongated body member formed with a leg member disposed at either end thereof, said legs being connected by a substantially flat planar platform member having an upwardly extending boss for receiving a brush
20 means,

a pair of grooves formed across the width of said flat planar platform, one on either side of said boss to form a pair of hinges, and

25 means disposed on the lower surface of each of said legs for slidably attaching said legs, one to the other whereby

said legs when attached one to the other are slidable along an axis of the handle
30 to move said boss angularly with respect to said axis.

11. An interproximal brush handle as set forth in claim 10, which further comprises a second pair of grooves formed across the width
35 of said flat planar platform, each spaced from said first pair of grooves to form a second pair of hinges.

- 16 -

12. An interproximal brush handle as set forth in claim 10, wherein the unitary elongated body member is manufactured of an elastomeric material.

5 13. An interproximal brush handle as set forth in claim 10, wherein said means disposed on the lower surface, each of said legs for slidably attaching said legs one to the other comprises an elongated protuberance disposed on
10 one of said legs and an elongated slotted opening formed in the surface of the other said leg to receive said protuberance in interfitting slidable engagement.

14. An interproximal brush handle as set
15 forth in claim 10, which further includes a pair of cavities, one formed in the upper surface of each of said legs such that a brush means mounted on said boss is enclosed within said cavities with said legs disposed with the leg
20 upper surfaces in facing relation.

15. An interproximal brush as set forth in claim 13, which further comprises means disposed on the upper surface of each of said legs for attaching said legs one to the other with said
25 upper surfaces and said cavities in facing relation.

16. An interproximal brush handle as set forth in claim 14, which further comprises a second pair of grooves formed across the width
30 of said flat planar platform, each spaced from said first pair of grooves to form a second pair of hinges.

17. An interproximal brush handle as set forth in claim 15, wherein the unitary elongated
35 body member is manufactured of an elastomeric material.

18. An interproximal brush comprising:

- 17 -

an elongated body member having a longitudinal axis and comprising a pair of parallel legs slidably attached to each other for movement relative one to the other in the direction of the body member longitudinal axis;

5 a substantially planar platform having a lower surface thereof facing said parallel legs when said legs are attached and brush means disposed on an upper opposite surface thereof and extending outwardly therefrom;

10 hinge means comprising first and second pairs of hinges, said first pair of hinges formed on said planar platform having one hinge located adjacent one side of said brush means and a second hinge located adjacent an opposite side of said brush means, said second pair of hinges having one hinge connecting said planar platform to one of said parallel legs and the other connecting said platform to the other of said parallel legs whereby movement of said legs relative one to the other is effective to move said brush means angularly with respect to said body member longitudinal axis, said first pair of hinges located intermediate said brush means and said second pair of hinges; and

25 an inwardly extending bumper means formed on said lower surface of said planar platform between said first pair of hinges;

30 said bumper means having a pair of opposite facing surfaces, a first surface disposed for contacting a portion of said platform between said one of said first pair of hinges and one of said second pair of hinges and a second surface for contacting a portion of said platform between the second of said first pair of hinges and the other of said second pair of hinges during movement of said brush means

- 18 -

angularly with respect to said body member.

19. An elongated interproximal brush handle comprising a unitary elongated body member formed with a pair of leg members
5 disposed one at each end thereof, said legs being connected by a substantially flat planar platform member located between said legs and having an upwardly extending boss for receiving a brush means,

10 a first pair of grooves formed across said flat planar platform and disposed on opposite sides of said boss to form a pair of hinges, and a second pair of grooves formed across said flat planar platform, each spaced
15 from said first pair of grooves to form a second pair of hinges each connecting said platform to a respective one of said legs,

means disposed on a lower surface of each of said legs for slidably attaching said
20 legs, one to the other whereby

said legs when attached one to the other are slidable along a longitudinal axis of the handle, and

a downwardly extending bumper means
25 formed on said planar platform on the surface opposite boss.

FIG. 1

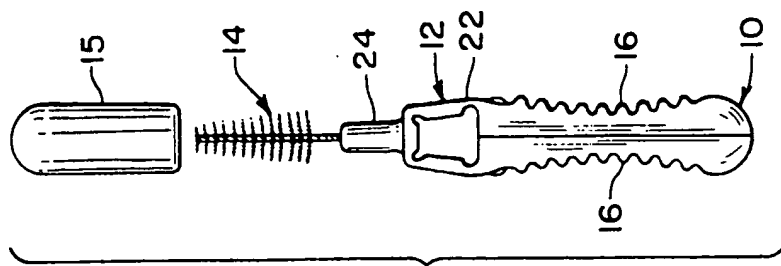


FIG. 2

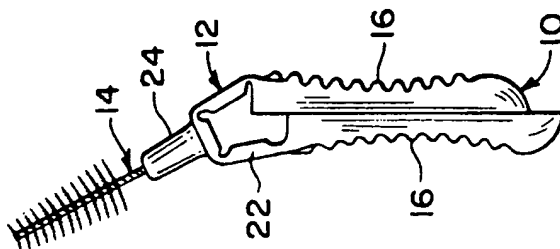


FIG. 3

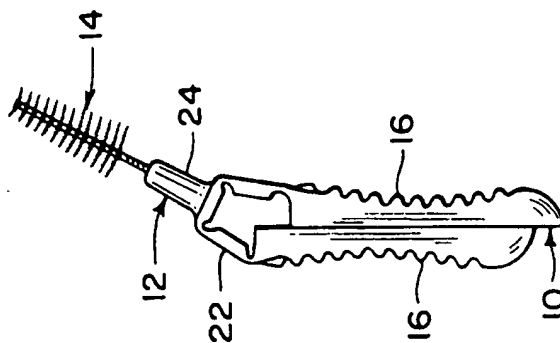


FIG. 4

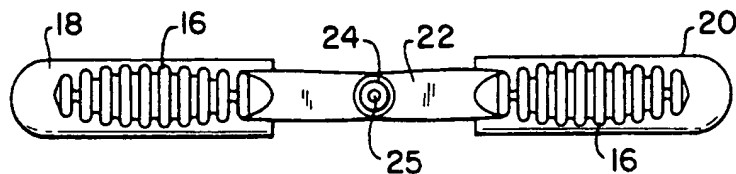


FIG. 5

FIG. 6

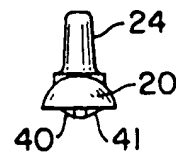
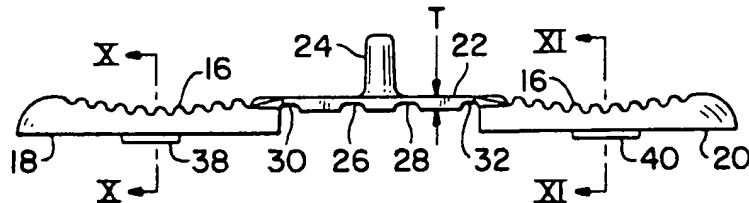


FIG. 7

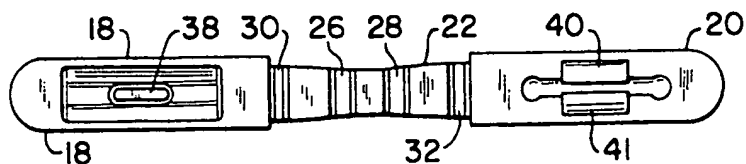


FIG. 10

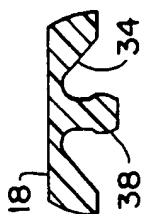


FIG. 11

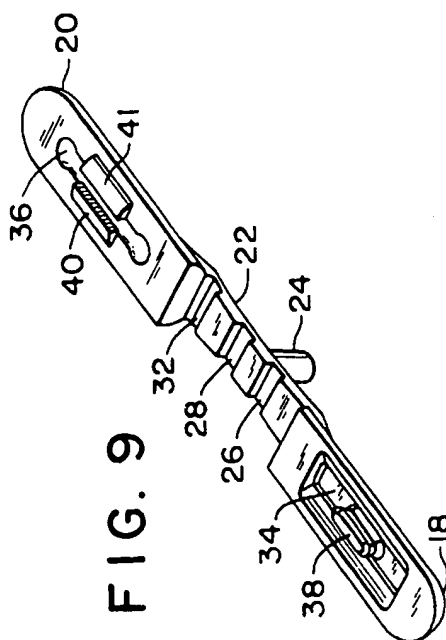
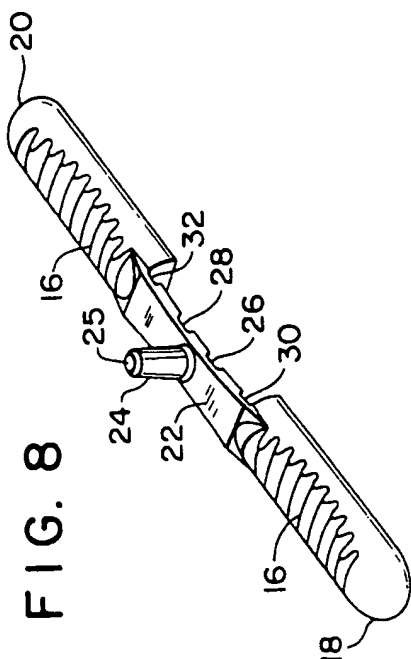
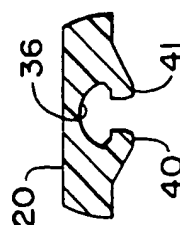


FIG. 12

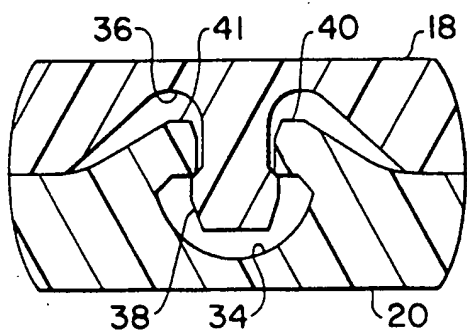


FIG. 13

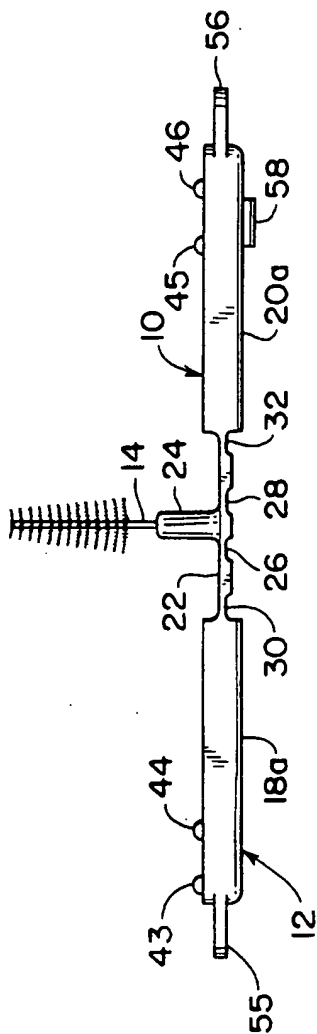


FIG. 14

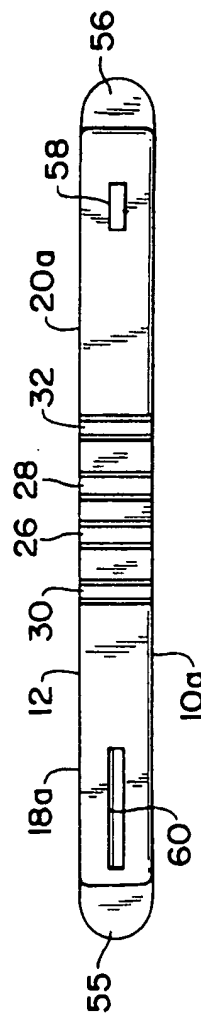


FIG. 15

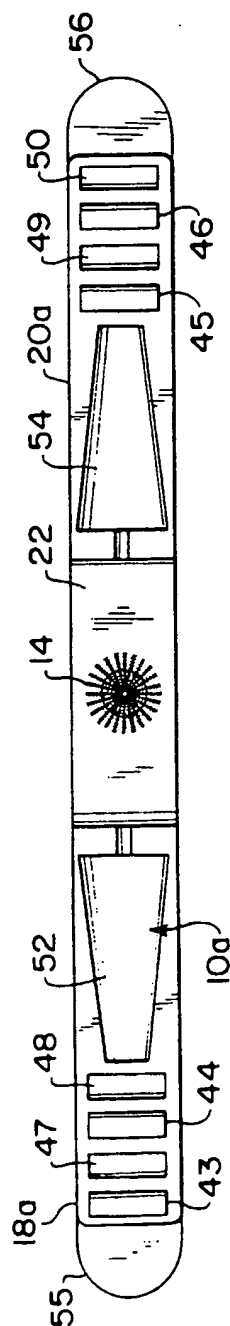


FIG. 16

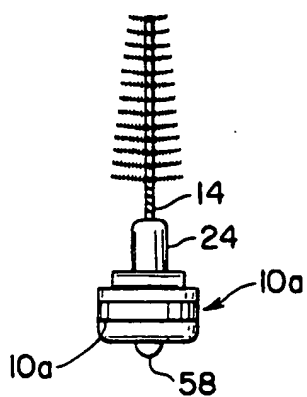


FIG. 18

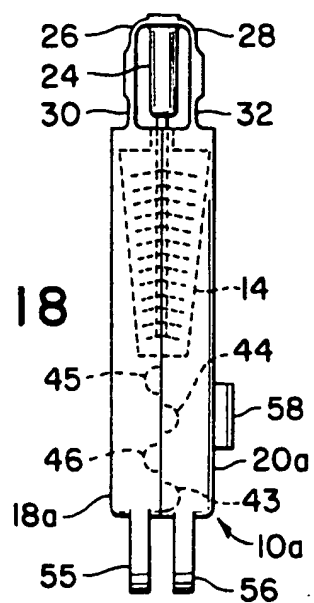
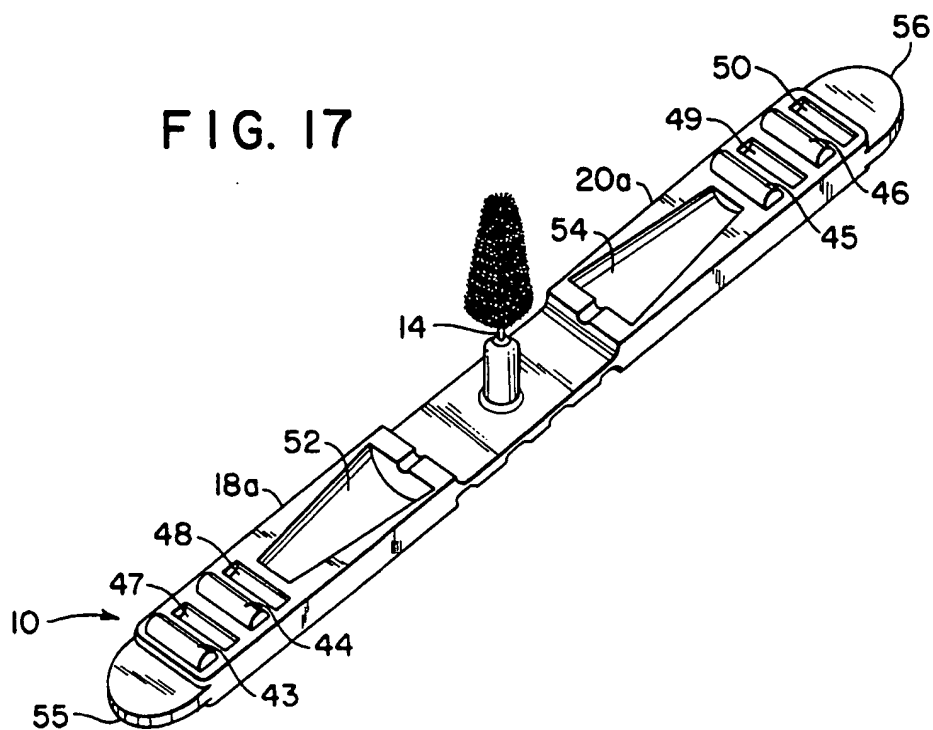


FIG. 17



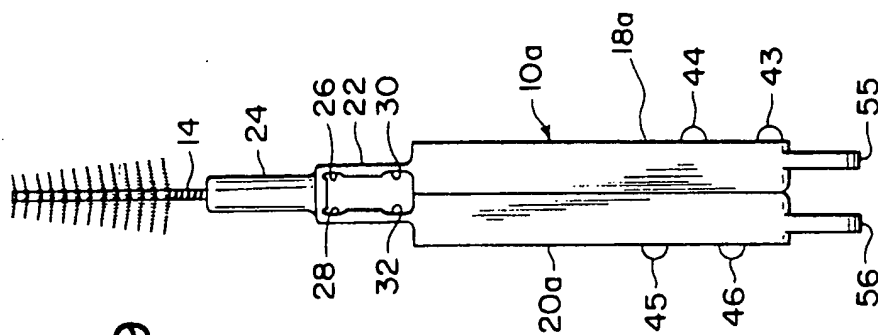


FIG. 19

FIG. 20

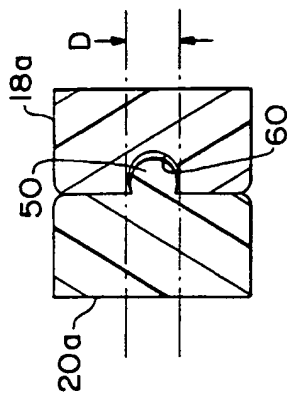


FIG. 21

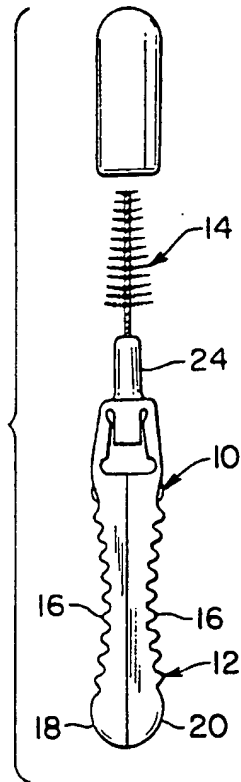


FIG. 22 FIG. 23

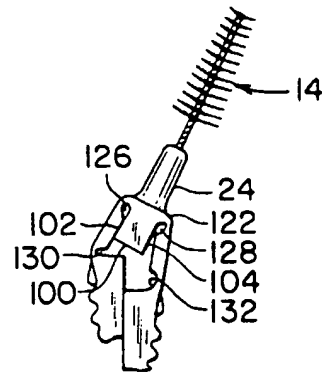
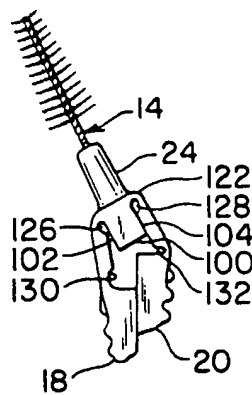


FIG. 24

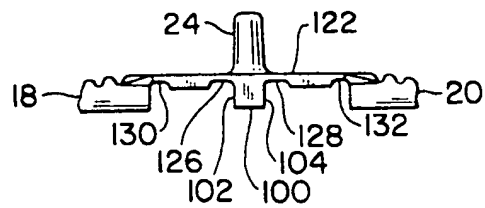


FIG. 26

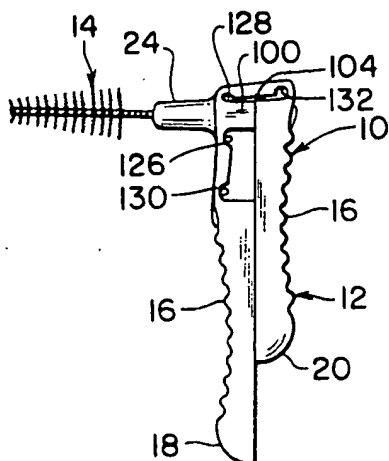
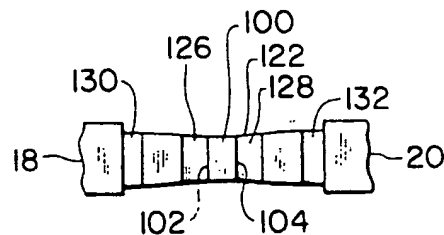


FIG. 25



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/02927

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A46B 9/04

US CL :15/167.1, 172, 185; 132/321

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 15/144.1, 145, 146, 167.1, 172, 185, 201, 206; 128/62A; 132/218, 308, 313, 317, 321; 04/104, 121, 128, 131, 133, 138; D28/7, 64

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 2,411,610 (AARON) 26 November 1946, see entire document.	1-5
X	US, S, D324,957 (PIANO) 31 March 1992, see entire document.	1, 2
---		-----
Y		3-7, 10, 12, 13
Y	US, A, 1,770,195 (BURLEW) 08 July 1930, see entire document.	3-7, 10, 12, 13
A	CH, B, 163,502 (KERBER) 16 October 1933.	1
A	DE, C, 393,882 (HONNEF) 19 April 1924.	1
A	US, A, 2,570,412 (VOGEL) 09 October 1951.	1

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 ☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

09 MAY 1994

Date of mailing of the international search report

27.05.94

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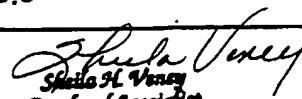
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 Sheila H. Vanev
 Patent Specialist

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/02927

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 2,604,649 (STEPHENSON ET AL.) 29 July 1952.	1
A	US, A, 3,193,864 (MAKOWSKY) 13 July 1965.	1
A	US, A, 3,350,737 (MAKOWSKY) 07 November 1967.	1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/016727

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl.⁷ A46B5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl.⁷ A46B5/00Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1940-1996 Toroku Jitsuyo Shinan Koho 1994-2005
Kokai Jitsuyo Shinan Koho 1971-2005 Jitsuyo Shinan Toroku Koho 1996-2005

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 8-508179 A (GILLETTE CANADA INC.), 03 September, 1996 (03.09.96),	1, 2, 4, 8, 11, 12
Y	Full text; all drawings & WO 94/21152 A	3, 5, 6, 7, 9, 10, 13
Y	JP 2000-23749 A (Sunstar Inc.), 25 January, 2000 (25.01.00), Full text; all drawings (Family: none)	6, 7, 9, 10

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Date of the actual completion of the international search
07 February, 2005 (07.02.05)Date of mailing of the international search report
15 March, 2005 (15.03.05)Name and mailing address of the ISA/
Japanese Patent Office

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